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Attorney Docket No.
SP02-260

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor:	BELLMAN, et al.	
Serial No:	10/722,769	Group Art Unit: 1765
Filing Date:	November 26, 2003	Examiner: CHEN, Kin Chan
Title:	METHOD USING MULTI-COMPONENT COLLOIDAL ABRASIVES FOR CMP PROCESSING OF SEMICONDUCTOR AND OPTICAL MATERIALS	**AMENDED APPEAL BRIEF**

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Sir:

AMENDED BRIEF ON APPEAL

This Amended Brief on Appeal is filed in response to the final Office action dated December 24, 2006 in the above-captioned patent application. Applicant filed Notice of Appeal on February 24, 2006 and submitted a Brief on Appeal on April 24, 2006. The Examiner issued a Notification of Non-Compliant Appeal Brief on May 30, 2006 (the "Notification of May 30, 2006"). In response, Application files this Amended Brief on Appeal as required under 37 C.F.R. § 41.37.

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated.

II. RELATED APPEALS AND INTERFERENCES

With respect to the appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-6, 8-12, 12-24 and 26-31 were rejected in the final Office Action dated December 24, 2005 and appealed to in this Brief. Claims 7, 13 and 25 were provisionally withdrawn due to a species election requirement and not considered so far in the examination by the Examiner. Claims 32-65 were previously canceled by Applicant in response to a restriction requirement.

IV. STATUS OF AMENDMENTS

All previous claim amendments were entered by the Examiner. No amendment was made after the final Office action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter in the appealed claims is summarized as follows, as presented from paragraph [0012], page 4 to paragraph [0017], page 5 of the specification.

There are two independent claims on appeal: claims 1 and 31.

Claim 1 is directed to a chemical-mechanical manufacturing process for planarizing or polishing semiconductor, metal, dielectric, glass, polymer, optical, and ceramic materials, the process comprising:

a) providing a workpiece;

b) providing a chemical-mechanical planarizing colloidal slurry, said slurry comprising non-agglomerated multi-component particles of a mixed-oxide, oxyfluoride, or oxynitride composition, each particle exhibiting a modified surface chemistry performance and having an isoelectric point (pH_{IEP}) greater than the pH of dispersed particles in solution; and

c) abrading a surface of said workpiece with said multi-component particles.

Claim 1 is disclosed in, inter alia, the following paragraphs in the specification: paragraph [0016], page 5; paragraph [0027], page 8; and illustrated in, inter alia, FIGURE 3, which is described in detail in paragraph [0026], pages 7-8.

Claim 31 is directed to method for using a CMP slurry solution, the method comprising providing a solution of multi-component particles, said particles having a composition comprising mixed 1) metal or metalloid oxides, 2) oxyfluorides, or 3) oxynitrides, each grouping (1, 2, or 3) individually alone or in combination thereof, said particles exhibiting a modified surface chemistry performance and having an isoelectric

point (pH_{IEP}) greater than or equal to about 5-6 with a stabilized particle dispersion at pH values of interest for CMP operations; dispersing said particles in a slurry; and applying said slurry to a workpiece.

Claim 31 is disclosed in, inter alia, the following paragraphs in the specification: paragraph [0016], page 5; paragraph [0027], page 8; and illustrated in, inter alia, FIGURE 3, which is described in detail in paragraph [0026], pages 7-8.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-3 stand rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Yano et al. (United States Patent No. 6,740,590, herein after "Yano et al.").

Clams 4-6, 8-12, 14-24 and 26-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yano et al.

VII. ARGUMENTS

A. Applicable Law

A1. 35 U.S.C. § 102

To be patented an invention must be new. 35 U.S.C. §§101, 102(a), (e). If it is not new, that is, if it was known to others, it is said to be "anticipated." Hoover Group, Inc. v. Custom Metalcraft, Inc., 66 F.3d 299, 302, 36 USPQ2d 1101, 1103 (Fed. Cir. 1995) ("lack of novelty (often called 'anticipation') requires that the same invention, including each element and limitation of the claims, was known or used by others before it was invented by the patentee"). Anticipation is a question of fact, as is the question of inherency. In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). Its proof differs from that for obviousness, 35 U.S.C. § 103, in that prior knowledge by others requires that all of the elements and limitations of the claimed subject matter must be expressly or inherently described in a single prior art reference. In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999); Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 1571, 7 USPQ2d 1057, 1064 (Fed. Cir. 1988). The single reference must describe and enable the claimed invention, including all claim limitations, with sufficient clarity and detail to establish that the subject matter already existed in the prior art and that its existence was recognized by persons of ordinary skill in the field of the invention. Crown Operations International, Ltd. v.

Solutia Inc., 289 F.3d 1367, 1375, 62 USPQ2d 1917, 1921 (Fed. Cir. 2002); In re Spada, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990) ("the reference must describe the applicant's claimed invention sufficiently to have placed a person of ordinary skill in the field of the invention in possession of it").

The anticipating reference "must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter." PPG Industries, Inc. v. Guardian Industries Corp., 75 F.3d 1558, 1566, 37 USPQ2d 1618, 1624 (Fed. Cir. 1996). When anticipation is based on inherency of limitations not expressly disclosed in the assertedly anticipating reference, it must be shown that the undisclosed information was known to be present in the subject matter of the reference. Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264, 1269, 20 USPQ2d 1746, 1749-50 (Fed. Cir. 1991). An inherent limitation is one that is necessarily present; invalidation based on inherency is not established by "probabilities or possibilities." Scaltech, Inc. v. Retec/Tetra, LLC., 178 F.3d 1378, 1384, 51 USPQ2d 1055, 1059 (Fed. Cir. 1999).

A2. 35 U.S.C. § 103

35 U.S.C. § 103 requires that an invention, to be patentable, must not be obvious over the prior art "at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." The landmark case on obviousness was Graham v. John Deere Co., 383 U.S. 1 (1966), which set forth three factors for determining whether an invention is obvious: (i) the scope and content of the prior art; (ii) differences between the prior art and the claims at issue; (iii) the level of ordinary skill in the pertinent art; and (4) objective evidences of non-obviousness such as commercial success, prior skepticism, copying, long felt but unresolved needs, failure of others, etc. All evidences must be considered and given weight in reaching a decision on obviousness under 35 U.S.C. § 103. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1561, 1 USPQ2d 1593, 1594 (Fed. Cir. 1985) cert. denied, 481 U.S. 1052 (1987); Hodosh v. Block Drug, 786 F.2d 1136, 1143, 229 USPQ 182, 188 (Fed. Cir. 1986), Cert. denied, 479 U.S. 827 (1986); Simmons Fastener Corp. v. Illinios Tool Works, 739 F.2d 1573, 1575, 222 USPQ 744, 746 (Fed. Cir. 1984), cert. denied, 471 U.S. 1065 (1985). Moreover, the prior art itself must suggest the desirability and, therefore, obviousness of a modification of a reference or the combination of references to achieve a claimed invention. Hodosh v. Block Drug, 786 F.2d at 1143 n.5, 229 USPQ at 187 n.5; In re Gorden, 733 F.2d 900, 902,

221 USPQ 1125, 1127 (Fed. Cir. 1984).

In making a rejection under 35 U.S.C. § 103(a), the Examiner must establish a prima facie case of obviousness first. Regarding this, the MPEP provides:

> The legal concept of *prima facie* obviousness is a procedural tool of examination which applies broadly to all arts. It allocates who has the burden of going forward with production of evidence in each step of the examination process. See *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *In re Linter*, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Saunders*, 444 F.2d 599, 170 USPQ 213 (CCPA 1971); *In re Tiffin*, 443 F.2d 394, 170 USPQ 88 (CCPA 1971), *amended*, 448 F.2d 791, 171 USPQ 294 (CCPA 1971); *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967), *cert. denied*, 389 U.S. 1057 (1968). The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

The MPEP, Eighth Edition, 2142 (emphasis added).

A proper prima facie case of obviousness requires the examiner to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated one of ordinary skill to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the examiner must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Co., 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1832, 1385, 165 USPQ 494, 496 (CCPA 1970). Moreover, both the suggestion and the reasonable expectation of success must be found in the prior art, not in the applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992).

B. The Rejections

B1. Rejections under 35 U.S.C. § 102(e) over Yano et al.

The Examiner has rejected claims 1-3 under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Yano et al. The Examiner

asserted:

> In a method for chemical mechanical polishing, Yano teaches a slurry may **comprise** non-agglomerated multi-component particles of inorganic particles (col.7, lines 7-12; so-called a mixture oxide in the instant claim) composition having an isoelectric point greater than the pH of dispersed particles in solution. Yano teaches that the polymer particles may be used to form aggregates with inorganic particles (Figs. 2 and Fig. 8) and produce uniformed **dispersed composite particles** (abstract), therefore, produce the dispersed (so-called non-agglomerated in the instant claim) particles of inorganic particles (so-called mixed oxide in the instant claims), **as clearly shown in Fig. 2.** Yano teaches that a surface of the workpiece may be abraded with the muti-component particles. Since the same inorganic particles (so-called a mixed oxide in the instant claim) used for the same CMP process, each particle exhibits a modified surface chemistry performance inherently. It is expected that the particle surface chemistry is modified (the isoelectric point of the multi-component particles displaced toward an alkaline pH value) relative to the surface chemistry performance of the individual, original base constituents of the particles. See abstract; cols. 7 and 8.

Emphasis original.

To anticipate claim 1, the reference Yano et al. must describe and enable the claimed invention, including all claim limitations, with sufficient clarity and detail to establish that the subject matter already existed in the prior art and that its existence was recognized by persons of ordinary skill in the field of the invention. Crown Operations International, Ltd. v. Solutia Inc., 289 F.3d 1367, 1375, 62 USPQ2d 1917, 1921 (Fed. Cir. 2002); In re Spada, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990) ("the reference must describe the applicant's claimed invention sufficiently to have placed a person of ordinary skill in the field of the invention in possession of it").

Claim 1, as amended, requires that the slurry comprises "non-agglomerated multi-component particles." However, it is clear from the teaching of Yano et al. that the particles in the CMP slurry taught in this reference agglomerated. "When the zeta potentials of the polymer particles and the inorganic particles are thus of opposite signs, the particles aggregate due to electrostatic force, combining together to form composite particles." Lines 33-37, column 7, Yano et al. There is ample teaching in Yano et al. that the particles agglomerate. The particles in the CMP slurry as taught in the examples have sizes in the μm range (1-5 μm in Example 1A, column 18, for example), clearly indicating that the particles agglomerated. Therefore, Yano et al. clearly teaches against claim 1 of

the present application.

The Examiner appears to have the view that, since Fig. 2 of Yano et al. shows a composite particle with particles having positive charges attached to a large polymer particle, and the particles having positive charges are shown in Fig. 2 to be separate from each other, thus the particles having positive charges are not agglomerated.

With regard to Fig. 2, Yano et al. describes as follows:

> FIG. 2 shows a model illustration of polymer particles and inorganic particles in a slurry according to the ninth aspect of the present invention in a polishing step. In this illustration 1 is a polymer particle, 2 designates inorganic particles, 3 is a polishing buff, 4 is a metal layer and 5 is an insulating layer. As shown here, aggregates are formed by adsorption of the inorganic particles 2 onto the surface of the polymer particles 1 in the slurry, since the surface potentials of the polymer particles 1 and the inorganic particles 2 are different according to the ninth aspect of the present invention.
>
> With these aggregates, the hard-surface inorganic particles 2 exhibit adequate polishing ability while the high elasticity of the polymer particles 1 prevents scratching and progressive erosion.

Applicant submits that the fact that the inorganic particles (those bearing positive charges) are adsorbed onto the surface of the polymer particles (those bearing negative charges) is an indication that the inorganic particles are "aggregated" into a polymer particle with larger size and forms part of an agglomerated particle. Such "aggregation" between the polymer particles and the inorganic particles is within the meaning of "aggregation" of claim 1 of the present application. Yano et al. uses the term "aggregate" or "aggregation" to refer to the combination of the particles to form a larger particle on numerous occasions. One of ordinary skill in the art should expect that the terms "aggregate" and "agglomerate," when used in the same art, should have essentially the same meaning or the common meaning when not interpreted by Applicant or by the author of the reference otherwise.

In addition, Applicant submits that Fig. 2 is merely a schematic illustration of the principle underlying the invention as disclosed in Yano et al. In reality, the inorganic particles may very well pack in close contact with each other in the aggregated particles. Applicant hypothesizes that, due to the adsorption of the inorganic particles onto the surface of the large polymer particles which has negative charges, the inorganic particles are likely to lose the initial positive charges, thus further adsorbs additional inorganic

particles to form the final aggregated particles. This hypothesis is supported by Examples of Yano et al. Take Examples 1 (last paragraph of column 16 and first paragraph of column 17) and 1A (lines 15-33 of column 18) of Yano et al. as examples. Example 1 discloses that the mean size of the polymer particles synthesized is about 0.24 μm. See lines 6-7, column 17. Example 1A discloses that the mean size of the inorganic particles (alumina) is 0.13 μm. See lines 21-22, column 18. Yet, Example 1A discloses the polymer particles of Example 1 and the alumina particles of Example 1A aggregate to form particles with a mean size of 1-5 μm. See lines 30-33, column 18. This is a clear indication that the aggregated particles comprise more than one layer of inorganic particles or more than one layer of polymer particles.

Therefore, Yano et al. fails to teach, explicitly or implicitly, that the inorganic particles comprised therein are non-agglomerated. Rather, Yano et al. clearly teaches that the inorganic particles are agglomerated.

In addition, Yano et al. fails to teach a multi-component inorganic particle in the meaning of claim 1 of the present application. By "multi-component," it is meant that each and every individual particle comprises at least two constituents as mentioned in the claim. See paragraph [0027] of the specification of the present application. The Examiner appears to have the view that column 7, lines 7-12 of Yano et al. discloses multi-component inorganic particles. Column 7, lines 7-12 of Yano et al. are reproduced as follows:

> The "inorganic particles" used may be inorganic particles composed of metal oxides such as alumina, silica, titania, zirconia, ceria, iron oxide and manganese oxide.
>
> These polymer particles and inorganic particles may be of a single type, or two or more types may be used in combination.

Emphasis added.

The above paragraphs fail to teach that in each and every particle, at least two constituents are included. Rather, by listing the particles individually as single oxides, followed by stating that the "particles ... may be used in combination" means that the particles with single but differing constituents as listed are used in combination. Therefore, these paragraph do not teach that in each single particle, there are at least two constituents (two oxides as listed previously).

Accordingly, Yano et al. does not explicitly or implicitly teach a "multi-

component" particle within the meaning of the claim 1 of the present application.

Therefore, Applicant submits that claim 1 is not anticipated by Yano et al. under 35 U.S.C. § 102(e).

Regarding claims 2 and 3, they further include limitations that the particles have modified surface chemistry and altered isoelectric point, respectively, relative to the original base constituents standing alone. As is clear from the specification of the present application, such modified surface is associated with the use of multi-component in each single particle. As discussed supra, Yano et al. does not teach a multi-component particle. Therefore, Yano et al. does not teach implicitly or explicitly neither of these claim elements.

For each and all of the above reasons, Yano et al. does not anticipate claims 1, 2 or 3.

B2. Rejections of claims 1-3 under 35 U.S.C. § 103 over Yano et al.

As indicated above, the Examiner has rejected claims 1-3 under 35 U.S.C. § 103 over Yano et al. citing exactly the same reasons for the rejections under 35 U.S.C. § 102(e) above.

Applicant submits that Yano et al., alone, does not establish a prima facie case of obviousness of the invention as claimed in outstanding claims 1-3 of the present application.

A proper prima facie case of obviousness requires the examiner to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated one of ordinary skill to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the examiner must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Co., 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1832, 1385, 165 USPQ 494, 496 (CCPA 1970). Moreover, both the suggestion and the reasonable expectation of success must be found in the prior art, not in the applicant's disclosure. In re Vaeck, 20 U.S.P.Q.2d 1438, 1442 (Fed. Cir. 1991). The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the

modification obvious unless the prior art suggested the desirability of the modification." In re Fritch, 23 U.S.P.Q.2d 1780, 1783-84 (Fed. Cir. 1992).

Applicant submits that Yano et al. does not teach or suggest all the claim limitations of claim 1-3, as discussed supra in connection with the rejections under 35 U.S.C. § 102(e).

Applicant further submits that Yano et al. does not suggest the desirability of modifying the teaching of Yano et al. to arrive at the inventions as claimed in outstanding claims 1-3 of the present application. Yano et al. does not teach or suggest the desirability of the multi-component particles; Yano et al. does not teach or suggest the desirability of having non-agglomerated particles. Rather, Yano et al. teaches the desirability of agglomerated particles. Thus, Yano et al. teaches against the inventions of claims 1-3 of the present application. Yano et al. does not teach or suggest modifying the surface chemistry of the particles by combining at least two components in a single particle.

Therefore, Applicant submits that the inventions of the present application in outstanding claims 1-3 are not unpatentable under 35 U.S.C. § 103(a) over Yano et al.

B3. Rejections of claims 4-6, 8-12, 14-24 and 26-31 under 35 U.S.C. § 103 over Yano et al.

The Examiner further rejected claims 4-6, 8-12, 14-24 and 26-31 under 35 U.S.C. § 103 over Yano et al.

The Examiner asserted that:

> In a method for chemical mechanical polishing, Yano teaches a slurry may **comprise** non-agglomerated multi-component particles of inorganic particles (col.7, lines 7-12; so-called a mixture oxide in the instant claim) composition having an isoelectric point greater than the pH of dispersed particles in solution. Yano teaches that the polymer particles may be used to form aggregates with inorganic particles (**Figs. 2 and Fig. 8**) and produce uniformed **dispersed composite particles** (abstract), therefore, produce the dispersed (so-called non-agglomerated in the instant claim) particles of inorganic particles (so-called mixed oxide in the instant claims), as **clearly shown in Fig. 2**. Yano teaches that a surface of the workpiece may be abraded with the muti-component particles. Yano teaches that a surface of the workpiece may be abraded with the muti-component particles. Yano teaches that pH value may be adjusted depending on the particle type (col. 8, lines 5-10). Since the same inorganic particles (so-called a mixed oxide in the instant claim) used for the same CMP process, each particle exhibits a modified surface chemistry performance. It is further expected that the particle surface chemistry is

> modified (such as the isoelectric point of the multi-component particle is displaced toward an alkaline pH value) relative to the surface chemistry performance of the individual, original base constituents of the particles. See abstract; cols. 7 and 8.
>
> The limitations of claims 4-6, 8-12, 14, 21, and 31 have been addressed above and rejected for the same reasons, supra.
>
> ...
>
> As to claims 16-20, Yano teaches the ranges of inorganic particles (so-called a mixed oxide) sizes, see col. 9, lines 6-9.

Emphasis original.

Thus the grounds on which the rejections of claims 4-6, 8-12, 14, 21 and 31 are essentially the same as those for the rejections of claims 1-3 under 35 U.S.C. § 103(a).

For essentially the same reasons, these rejections are traversed. In addition, since all claims 4-6, 8-12, 14, 16-21 and 31 are dependent from outstanding claim 1, they are not unpatentable under 35 U.S.C. § 103(a) because claim 1 is not unpatentable under 35 U.S.C. § 103(a).

Regarding particle size, in the part pointed out by the Examiner, Yano et al. teaches that "[t]he preferred range for the mean particle size of the polymer particles and inorganic particles according to the present invention is 0.01-1.0 μm, preferably 0.01-0.5 μm, and especially 0.01-0.3 μm, for each." The Examiner's attention is directed to the fact that these are the size ranges of particles before agglomeration. The actual particle size in the CMP slurry is much larger, as indicated in the examples in Yano et al. The Examiner's attention is particularly directed to the fact that the particle ranges cited in claims 16-20 of the present application are smaller than those of the agglomerated particles in the examples of Yano et al.

Therefore, Yano et al. does not establish a prima facie case of obviousness of any of claims 16-20 in the present application.

C. Conclusion

In conclusion, Applicant requests a reversal of the grounds of rejection maintained by the Examiner.

Since certain claims have not been examined by the Examiner due to a species election requirement, Applicant requests a remand of the application to the Examiner for further examination of the claims directed to the "non-elected species."

If there are any other fees due in connection with the filing of this Brief on Appeal,

please charge the fees to our Deposit Account No. 03-3325. Applicant believes no extension of time is necessary to render this Brief timely. If additional fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

The undersigned attorney has been granted limited recognition by the Office of Enrollment and Discipline of the USPTO to practice before the USPTO in capacity as an employee of a Corning Incorporated. The limited recognition number accorded the undersigned is indicated below.

Please direct any phone call to the undersigned at (607) 248-1253.

Respectfully submitted,

Dated: June 22, 2006

By: ______________________

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VIII. CLAIMS APPENDIX

The claims involved in the appeal are listed as follows:

1. A chemical-mechanical manufacturing process for planarizing or polishing semiconductor, metal, dielectric, glass, polymer, optical, and ceramic materials, the process comprising:

   a) providing a workpiece;

   b) providing a chemical-mechanical planarizing colloidal slurry, said slurry comprising non-agglomerated multi-component particles of a mixed-oxide, oxyfluoride, or oxynitride composition, each particle exhibiting a modified surface chemistry performance and having an isoelectric point (pH_{IEP}) greater than the pH of dispersed particles in solution; and

   c) abrading a surface of said workpiece with said multi-component particles.

2. The process according to claim 1, wherein said particle surface chemistry is modified relative to the surface chemistry performance of the individual, original base constituents of said mixed-oxide particle.

3. The process according to claim 2, wherein said isoelectric point of said multi-component particle is displaced toward an alkaline pH value relative to the surface chemistry performance of the individual, original base constituents of said particle.

4. The process according to claim 1, wherein said particle has an isoelectric point (pH_{IEP}) greater than or equal to about 5-6 with a stabilized particle dispersion at pH values of interest for CMP operations.

5. The process according to claim 1, wherein said isoelectric point of said multi-component particle is greater than or equal to about pH 7.

6. The process according to claim 1, wherein said multi-component particles have a composition $\alpha_x\beta_y$, wherein α is a transition metal, metalloid, alkaline earth, rare earth, or alkali element, or a plurality combination thereof, β is O and/or N, and x and $y \neq 0$.

7. The process according to claim 6, wherein SiAlON is a plurality combination.

8. The process according to claim 6, wherein quantities of glass-formers/modifiers comprising Al_2O_3, B_2O_3, CeO_2, GeO_2, P_2O_5, PbO_2, Ta_2O_5, TiO_2, ZrO_2, are added to

silicate materials to adjust the surface chemistries and hardness of said particles.

9. The process according to claim 6, wherein for non-silicate-based materials α is selected from the group consisting of Al, As, B, Ca, Co, Ce, Cr, Cu, Er, Fe, Ga, Ge, In, K, La, Li, Mg, Mn, Na, Ni, P, Pb, Pr, Sb, Sn, Ta, Ti, Tl, Tm, V, W, Y, Yb, Zn, and Zr.

10. The process according to claim 1, wherein said mixed-oxide components include CeO_2-ZrO_2; CeO_2-Al_2O_3; GeO_2-SiO_2; GeO_2-Al_2O_3-SiO_2; Al_2O_3-SiO_2; CaO-Al_2O_3-SiO_2;, P_2O_5-SiO_2, TiO_2-SiO_2, Ta_2O_5-SiO_2, Sb_2O_3-SiO_2, Sb_2O_3-Al_2O_3-α_2O-SiO_2, wherein α = Li, Na, K, Rb, Cs; βO_a-Al_2O_3-SiO_2, wherein β = Be, Mg, Ca, Ba, Sr, and $a \neq 0$; MgO-Al_2O_3; or such compositions doped with ~1 or 3-15 wt% F.

11. The process according to claim 1, wherein said abrasive has a multi-component composition comprising a combination of constituents selected fromthe group consisting of SiO_2, Al_2O_3, B_2O_3, and at least two or optionally three other oxides.

12. The process according to claim 1, wherein said mixed-oxide particle comprises in weight percent on an oxide basis, about 30-99% SiO_2, 1-37% Al_2O_3 and at least one of the following: 0-70% Li_2O, 0-70% Na_2O, 0-70% K_2O, 0-70% BeO, 0-70% MgO, 0-70% CaO, 0-70% SrO, 0-70% BaO, 0-70% SbO_2, 0-70% SnO_2, 0-70% B_2O_3, 0-70% GeO_2, 0-70% CuO, 0-70% CuO_2, 0-70% P_2O_5, 0-70% PbO_2, 0-70% Ta_2O_5, 0-70% TiO_2, 0-70% CeO_2, 0-70% ZrO_2, and/or 0-20% F, either alone or in combinations thereof.

13. The process according to claim 1, wherein said mixed-oxide particle includes at least three constituents selected from either SiO_2- or Al_2O_3-derivatives doped with metalloid, transition metals, alkali, alkaline earth, or rare earth components.

14. The process according to claim 1, wherein said particles are fumed silicate particles.

15. The process according to claim 1, wherein said multi-component particle has a pre-selected surface chemistry and hardness tailored to said workpiece surface.

16. The process according to claim 1, wherein said multi-component particle has at least two components, and with a particle size in the range of about 1–30 nanometers.

17. The process according to claim 1, wherein said multi-component particle has at least three components, and a particle size in the range of about 1-500 nanometers.

18. The process according to claim 17, wherein said multi-component particle has at least three components, and each with a particle size in the range of about 1-200 nanometers.

19. The process according to claim 1, wherein said multi-component particle has at least three components, and a particle size in the range of about 1-150 nanometers.

20. The process according to claim 19, wherein the size of said multi-component particles range from about 10 nm to up to about 150 nm.

21. The process according to claim 1, wherein said multi-component particles each has either a spherical, near-spherical, elongated, or amorphous morphology.

22. The process according to claim 1, wherein said multi-component particles are formed according to a flame hydrolysis process.

23. The process according to claim 1, wherein said multi-component particles are formed according to a sol-gel process.

24. The process according to claim 1, wherein said multi-component particles are dispersed in either an aqueous or non-aqueous suspension.

25. The process according to claim 1, wherein said multi-component particles are either oxyfluoride or oxynitride compositions.

26. The process according to claim 1, wherein said workpiece has a non-planarized surface.

27. The process according to claim 1, wherein providing a workpiece includes providing a semiconductor integrated circuit workpiece having a metallized interconnection structure.

28. The process according to claim 26, wherein providing a workpiece includes providing a semiconductor integrated circuit silicon wafer with a lithographic integrated circuit pattern and depositing at least one metallized interconnection layer.

29. The process according to claim 1, wherein providing a workpiece includes providing a semiconductor integrated circuit workpiece having an interlevel dielectric structure.

30. The process according to claim 28, wherein providing a workpiece includes depositing an interlevel dielectric material on a semiconductor integrated circuit workpiece.

31. A method for using a CMP slurry solution, the method comprising providing a solution of multi-component particles, said particles having a composition comprising mixed 1) metal or metalloid oxides, 2) oxyfluorides, or 3) oxynitrides, each grouping (1, 2, or 3) individually alone or in combination thereof, said particles exhibiting a modified surface chemistry performance and having an isoelectric point (pH_{IEP}) greater than or equal to about 5-6 with a stabilized particle dispersion at pH values of interest for CMP operations; dispersing said particles in a slurry; and applying said slurry to a workpiece.

32-65. *(Canceled)*

IX. EVIDENCE APPENDIX

NONE

X. RELATED PROCEEDINGS APPENDIX

NONE